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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/838,684	04/19/2001	William S. Wong	D/A1205	8971

7590 12/10/2002

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EXAMINER

PEREZ RAMOS, VANESSA

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 12/10/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/838,684

Applicant(s)

WONG ET AL.

Examiner

Vanessa Perez-Ramos

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 8, 11, 19, 23 and 25-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, 8, 19, 23 and 26, the word "predetermined" is vague and indefinite, as it is a subjective term.

In claims 11 and 25, trademarks can not be included in claim language.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jang et al. (U.S. 6,401,002) in view of Wolf, S. (Silicon Processing for the VLSI Era, vol. 1, pp. 564-565).

In regard to claims 1, 3-4, 12-13, 19-20 and 23-24, Wolf discloses that, during semiconductor manufacturing processes, organic films are deposited over materials to be etched, and these organic films serve as masks during dry etching. During etching, the masks

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are not etched, which means that what is etched is the material around it. After etching, the masks are removed by other etching processes (page 564, lines 10-19).

Wolf does not disclose that the organic masks can be formed of a phase change masking material ejected in liquid form droplets, nor does Wolf disclose that the surface being etched is kept at a below freezing temperature, as the claimed invention does.

Jang discloses a method wherein liquid droplets of a solidifiable liquid composition (col. 7, lines 44-48) , including wax (col. 8, lines 27-30) are deposited over an object to be treated, and wherein the object to be treated lies in a platform that is pre-cooled at below the freezing temperature so that the discharged material can rapidly become solidified when in contact with it. Furthermore, Jang discloses that some of the advantages of this method are: building layers with high adhesion to previously deposited layers or materials (col. 8, lines 41-43); improved accuracy (col. 8, lines 66-67 and col. 9, line 1), etc.

It is the Examiner's position that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Wolf by specifically utilizing organic masks from a phase change masking material ejected in liquid form droplets, including wax, as per Jang, because this can result in layers with high adhesion to previously deposited layers or materials, and improved accuracy, which is extremely desirable during semiconductor manufacturing. Furthermore, in regard to the limitation that the substrate be kept at below freezing temperatures, even though Jang discloses that the object to be treated is kept in a platform and that it is the platform that is kept at below freezing temperatures, it is the Examiner's position that this inherently reads on Applicant's limitation, and, even if it doesn't, it would be obvious to one of ordinary skill in the art to modify Jang by keeping not only the platform, but also the object on the platform (the substrate), at the claimed temperature, to assure the solidification of the liquid droplets upon discharge.

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In regard to claims 2 and 16-18, Jang discloses several different configurations with variations on the temperature of the liquid and the temperature of the object to be treated (col. 14, lines 66-67, col. 15, lines 1-67 and col. 16, lines 1-18), which shows that the variation and control of process parameters, such as temperature, is obvious to and expected from one skilled in the art.

In regard to claims 5-6 and 21, Jang discloses that a useful droplet deposition device is a piezoelectric device that uses a pulse generator to provide signals, and include several reservoirs (col. 11, lines 33-67 and col. 12, lines 1-29).

In regard to claim 7, Jang discloses temperature control, heating and cooling in the reservoir of the phase change material (col. 12, lines 443-51), which reads on Applicant's "using thermal effects in a reservoir".

In regard to claims 8-10, these claims differ from claims 1-7 above by adding an additional layer that is deposited over the first and which undergoes the exact same process as the previously deposited layer. It is the Examiner's position that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Wolf in view of Jang by repeating the same process with as many different layers as necessary, because it is well known in the art that semiconductor devices have multiple layers, and that each and every layer that is etched may need a masking layer to protect the portions that are not to be etched.

In regard to claim 11, the claimed wax is well known in the art and its use would have been obvious to one of ordinary skill at the time of the invention.

In regard to claim 14, it would have been obvious to one of ordinary skill in the art to place the surface to be etched in a chamber, and furthermore to control the pressure of the system.

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In regard to claim 15, the use of organic solvents is well known in the art and would have been obvious to one of ordinary skill at the time of the invention.

In regard to claim 22, Jang discloses that the droplets are generated using an ink-jet system (col. 9, lines 10-21 and col. 11, lines 2-23).

In regard to claim 25, the claimed material is well known in the art and its use would have been obvious to one of ordinary skill at the time of the invention.

In regard to claims 26-30, these claims differ from claims 1-25 above by adding the limitation that the masking material is deposited along with a liquid carrier that evaporates. Jang discloses that one embodiment of his invention comprises the use of a material dispersed in a liquid, wherein the liquid is fast vaporizing and evaporates while the other material remains.


5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vanessa Perez-Ramos whose telephone number is 703-306-5510. The examiner can normally be reached on Mon-Thurs 7:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-5665.

Vanessa Perez-Ramos
Examiner
Art Unit 1765

VPR
December 7, 2002


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